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Exhibit

Agilent Technologies

INVENTION DISCLOSURE

PAGE ONE OF 6

PDNO 10010464 DATE RCVD ATTORNEY GMS/LSBU-BRSU

Instructions: The information contained in this document is **COMPANY CONFIDENTIAL** *and may not be disclosed to others without prior authorization. Submit this disclosure to the Agilent Technologies Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.*

Descriptive Title of Invention:

A Technique for Choosing Multiple Print Frames to Improve Array Yield

Name of Project: Pamela

Product Name or Number: N/A

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):

Was a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s)

Was the invention disclosed to anyone outside of AGILENT TECHNOLOGIES, or will such disclosure occur? If so, the date(s) and name(s):

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-553-3061 or 408-553-3061.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.)

Was the invention built or tested? If so, the date:

Yes

Was this invention made under a government contract? If so, the agency and contract number:

Description of Invention: *Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).*

A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).
B. Problems solved by the invention.
C. Advantages of the invention over what has been done before.
D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

Signature of Inventor(s): I (we) hereby submit this disclosure on this date: [ ].

Employee No.	Name	Signature	Telnet	Mailstop	Entity & Lab Name
570164	Svetlana Shchegrova	[signature]	1-485-4086	25U	2300 BRSU
13790	William D. Fisher	[signature]	1-485-5182	24M-C	42LB CORL
268938	Peter G. Webb	[signature]	1-485-3756	25U	2300 BRSU

(If more than four inventors, include additional information on another copy of this form and attach to this document)

Form 3.1 IDF1016.DOC Rev. 10/26/00

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Signature of Witness(es): *(Please try to obtain the signature of the person(s) to whom invention was first disclosed.)*
The invention was first explained to, and understood by, me (us) on this date: [ ]

Full Name	Signature	Date of Signature
Michael P. Caren		
Jeffrey T. Kernan		

Inventor & Home Address Information: *(If more than four inventors, include addl. information on a copy of this form & attach to this document)*

Inventor's Full Name	Svetlana Shchegrova
Street	325 Union Ave. Apt. 359
City	Campbell
State	CA
Zip	95008
Do you have a Residential P.O. Address? P.O. BOX / City / State / Zip	
Greeted as *(nickname, middle name, etc.)*	Sveta
Citizenship	Russia

Inventor's Full Name	William D. Fisher
Street	1596 Bonnie Joy Ave.
City	San Jose
State	CA
Zip	95129
Do you have a Residential P.O. Address? P.O. BOX / City / State / Zip	
Greeted as *(nickname, middle name, etc.)*	Bill
Citizenship	USA

Inventor's Full Name	Peter G. Webb
Street	345 Willow Rd.
City	Menlo Park
State	CA
Zip	94025
Do you have a Residential P.O. Address? P.O. BOX / City / State / Zip	
Greeted as *(nickname, middle name, etc.)*	Pete
Citizenship	Australia

Inventor's Full Name	
Street	
City	
State	
Zip	
Do you have a Residential P.O. Address? P.O. BOX / City / State / Zip	
Greeted as *(nickname, middle name, etc.)*	
Citizenship	

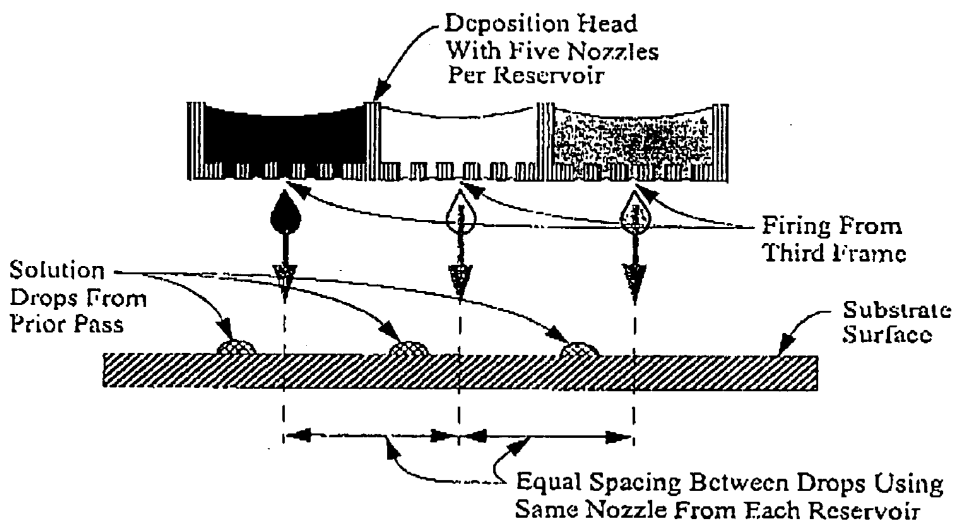
3/6

Invention Disclosure:

A Technique for Choosing Multiple Print Frames to Improve Array Yield
by
Svetlana Shchegrova, Bill Fisher, and Peter Webb

Background

In the biomedical field, the ability to test an unknown sample material against many different known solutions at one time is very important. The known solutions are generally arranged in some specified format on a substrate surface with the collective group of solutions called an array. Each array may contain many thousands of different solutions. The arrays are built up in a sequential manner by depositing a subset of the known solutions at a time using some form of thermal or piezoelectric inkjet technology. The different solutions are held in reservoirs of the deposition head. Redundancy is built into the deposition head by having multiple nozzles available to fire a solution from for each reservoir. To maintain the proper spacing of the solutions in the array and minimize the repositioning of the deposition head for each pass across the array, the same nozzle location in each reservoir is used to fire the solutions. This grouping of using the same nozzle from each reservoir is called a frame. A typical setup for fabricating arrays is shown in the following diagram.

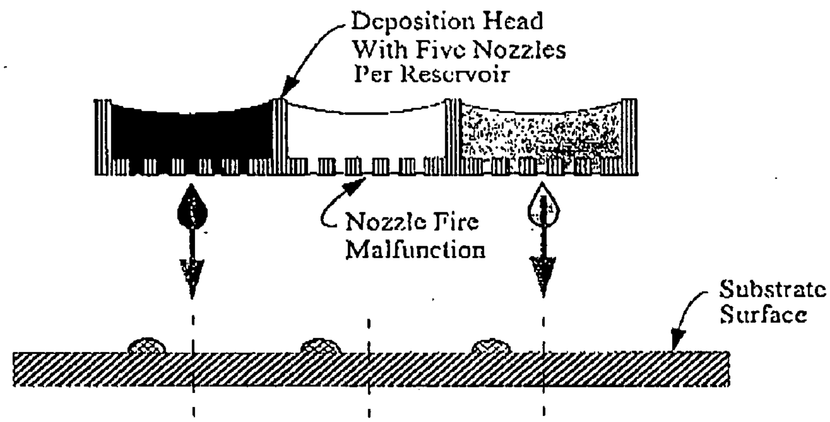


The advantage for having multiple nozzles to fire a solution from is if one of the nozzles malfunctions there are other nozzles available to take its place. The ability to deposit the solution would be lost if only one nozzle were available and it failed to function properly. An example of

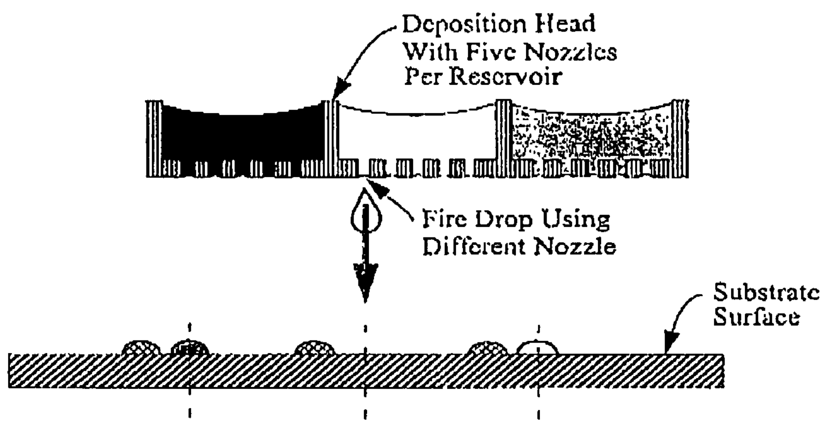
4/6

how multiple nozzles would be used when there is a nozzle failure is shown in the following diagram.

First Pass



Second Pass



After the first pass of the deposition head across the array, it is determined that one of the nozzles within the chosen frame did not fire. A different nozzle is then used to fire the missing drop of solution on a second pass across the array by repositioning the deposition head (or substrate) so that the drop is placed at the correct location in the array. This is referred to as multipass printing.

5/6

Problem

It is important to realize that the ability to do multipass printing and take advantage of having multiple nozzles per reservoir relies on the fact that nozzle misfires can be detected in the first place. If there is no way to detect how well the solution drops are being deposited on the substrate surface, there is no feedback mechanism for picking another nozzle which makes multipass printing impossible. The modes of nozzle failure are not just if the drop was fired or not, but also include how well the drop was fired. In other words, there is the standard "hard" failure where there is an electrical or mechanical problem with a nozzle and it will never work again. And, there is the "soft" failure where for some reason for a particular load of solution the nozzle doesn't fire the correct amount of solution, or the solution breaks up into multiple smaller drops, or the location of the solution is outside the desired position tolerance. But, for a subsequent load of solution the same nozzle may work just fine. Unfortunately, it is difficult to know how the nozzles will behave for each load of solutions. Once a frame of nozzles is chosen for depositing solutions within an array, soft nozzle failures are not correctable and result in having to scrap the array. Also, the only way to tell how well the nozzles are performing is after the solutions have been deposited on the array which is too late for most cases.

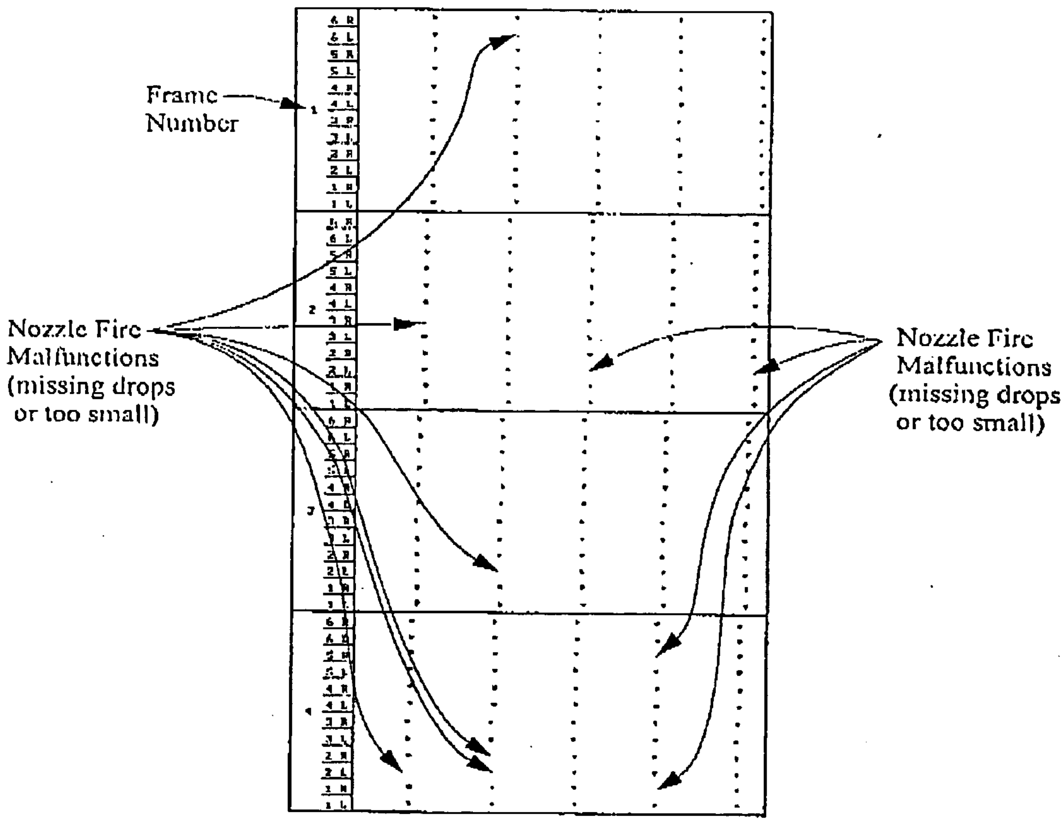
Solution

Our approach is to test all the nozzle firings before any solutions are deposited on the arrays. We use a line scan camera to follow behind the deposition head and view the solution drops immediately after they land on the substrate surface. This way both hard and soft failures can be detected and corrected before any arrays are made. If a nozzle is exhibiting a soft failure mode the nozzle is disabled and effectively turned off from further firing for that load of solution. Since the nozzles are grouped by frames, each frame is fired sequentially across a part of the substrate not used for making arrays. The different frame firings across the substrate is called a test print. Multiple test prints can be performed to gather data on each nozzle to determine firing reliability. A sample test print of four nozzle frames on a substrate surface from an image of the line scan

6/6

camera is shown in the following diagram where the deposition head has twelve rows by five columns of solution reservoirs.

Nozzle Fire Test Pattern



For each frame the same sixty different solutions are being deposited on the substrate surface. As can be seen in the above figure, each adjacent frame of nozzle fires is shifted by one nozzle for each reservoir. For the test print shown in the figure above, no one frame of nozzles is able to fire all the different solutions. There are nozzles that didn't fire any solution and some that didn't fire enough solution. Frame 3 has only one nozzle malfunction which for the same solution reservoir has working nozzles in frames 1 and 2. Thus, the appropriate nozzle in either frames 1 or 2 can be used to fill in the missing solution spot in frame 3. The advantage of being able to view the firing of all of the nozzles in each reservoir allows us to apply different criteria for selecting which frames to use to maximize the array yield and also minimize the number of passes of the deposition head across the array.